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WANG, JIN CHENG	
ART UNIT	**PAPER NUMBER**
2672	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/210,055	MILLER, JOHN DAVID
	Examiner	**Art Unit**
	Jin-Cheng Wang	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20,22,24,26,28,32,34 and 37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20,22,24,26,28,32,34 and 37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment filed on 12/27/2004 has been entered. Claims 20, 22, 24, 26 28, 32, 34, and 37 are pending in the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 20, 22, 24, 26 28, 32, 34, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obata U.S. Patent No. 5,222,203 (hereinafter Obata).

Re claim 20, Obata teaches selecting a mode, the mode is FRONT-ONLY, BOTH SIDES, or BACK-ONLY (*The mode is in relation to the viewpoint vector, the light source vector and the normal vector of the object surface. The directions of these vectors govern the mode for FRONT-ONLY, BOTH SIDES, or BACK-ONLY; column 7*), determining a viewing angle (*The opposite light source vector –VL with respect to the reference x-axis of an arbitrary reference frame forms the viewing angle and the light source vector VL coincides with the viewpoint vector VE. For the sake of subsequent explanation, the Examiner denotes the angle va_alpha*), determining an object angle (*The normal vector of the object surface with respect to the reference x-axis of an arbitrary reference frame forms the object angle. For the sake of*

subsequent explanation, the Examiner denotes the angle oa_beta), calculating a theta, theta equals the viewing angle minus the object angle plus pi (*theta is the angle between the normal vector VN and the light source vector VL or the viewpoint vector VE which is in relation to the previously identified viewing angle and object angle. theta = pi – oa_beta + va_alpha; column 7*), assigning a function of theta to alpha, if the mode is FRONT-ONLY or BOTH-SIDES (*the alpha being the cosine function of theta; see column 6*),

Obata explicitly discloses in Figs. 2 and 8 the angle of incidence theta and the brightness value or the color value depends on a non-linear function of the angle theta (column 6-7). From Obata's disclosure, the theta angle depends on the light source vector VL and the normal vector VN. It can be understood from Obata's reference that the angle theta is equal to pi – {the angle between the normal vector VN of the object surface with respect to the x-axis of any reference frame} + {the angle of the opposite light source vector –VL (viewing from the light source) with respect to the x-axis of any reference frame}. It is also clear that the angle between the normal vector VN of the object surface with respect to the x-axis of any reference frame is the object angle of the claimed invention and the angle of the opposite light source vector –VL as viewing from the light source with respect to the x-axis of any reference frame forms the viewing angle of the claimed invention. The viewing angle and the object angle are inferred from the Obata's disclosure in Figs. 2 and 8 and column 6-7. The viewing angle and the object angle are directly related to the angle theta and the angle theta is critical for the determination of the color value or the transparency value and Obata.

Because the color value or transparency value can never be less than zero, alpha = cos (theta) should be always larger than or equal to zero, Obata implicitly teaches comparing alpha

to zero; assigning zero to alpha, if the mode is FRONT_ONLY (depending on the normal vector VN in relation to the light source vector VL) and alpha is less than zero. Similarly, Obata implicitly teaches the transparency value to be larger than zero or equal to zero and thereby Obata teaches assigning zero to alpha, if the mode is BACK_ONLY, and alpha less than zero. Because the color value or transparency value can never be less than zero, alpha = cos (theta) should be always larger than or equal to zero, Obata implicitly teaches assigning minus alpha to alpha, if the mode is BOTH-SIDES, and alpha is less than zero (column 6-7). These above steps are measures to prevent the alpha value being less than zero which one of the ordinary skill in the art should understand that alpha value for alpha blending should not be less than zero.

Therefore, Obata further discloses assigning a function of theta minus pi to alpha, if the mode is BACK ONLY (*Note that assigning a function of theta minus pi is equivalent to assigning a function of theta because cosine of theta minus pi reflects the brightness value after blending with the light source or the background image and is equal in absolute value to cosine of theta. BACK_ONLY corresponds to the viewpoint vector VE and the light vector being in opposite direction in which VN is rotated 180 degrees to obtain a normal vector and FRONT_ONLY corresponds to the viewpoint vector VE being in the same direction to the light source vector VL; column 6-7*); comparing alpha to zero; assigning zero to alpha, if the mode is FRONT ONLY and alpha is less than zero (*Since the brightness value for an image object should be positive, the inner product between the normal vector of the object surface and the light source vector or cosine(pi – oa_beta +va_alpha) should be positive as well; column 6-7*); assigning zero to alpha, if the mode is BACK ONLY, and alpha less than zero (*the image object*

is displayed as an opaque object and since the brightness value for an image object should be positive, alpha value should be zero if it is less than zero); assigning minus alpha to alpha, if the mode is BOTH-SIDES, and alpha is less than zero (*since the brightness value for an image object should be positive, alpha value should be zero if it is less than zero*; column 6-7).

In other words, Obata discloses a method for displaying a translucent object or an opaque object on a display screen comprising a step of displaying a translucent object by calculating the color intensity. The color intensity comprises an ambient light component and the diffused transmitted light component, which is in relation to an angle made between a normal vector of the object surface and a light source vector as being at normal to the light surface, the diffused transmitted light coefficient, and the intensity value corresponding to the light source. The angle of incidence of the incident light source being over the range of 0 to pi, so that the object develops its own color intensity on the basis of the diffused transmitted light coefficient Ktr, the intensity value corresponding to the incident light from a light source. The intensity or brightness of the image object is described by the color and/or transparency values. Obata teaches that, the actual display color of the image object is determined by **mixing the color of the image object and the color of the background image**, based upon the transmissivity of the translucent object (column 1). *The transmissivity of the object is reflected as coefficient value in the image blending which is not related to the alpha value at all.* Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object can be controlled in such a way that an opaque object can be displayed by providing a zero value output from the diffused transmitted light component and a translucent object can be displayed by providing zero value outputs from the diffused reflection light

component and the specular reflection light component (column 7) wherein the background object is displayed as blurred to obtain a superior realistic display (column 6). In the case for translucent image object, the intensity of the image object is governed by the Itr component which is proportional to the transparency factor. The transparency of the image object is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light depending upon the relationship among the light source, the viewpoint and the object surface. The transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters under certain conditions. The intensity of the diffused transmitted light greatly varies in accordance with the angle theta made between the normal vector of the object surface and the light source vector as being normal to the light source surface and how much the light comes through depends upon the cosine function of theta. The angle theta is usually 0 to pi, and theta = pi signifies the case that the object surface is at a position opposite to the light source, whereas theta = 0 means the case that the object surface is in a parallel and opposed relation to the light source so that it is in the most bright condition.

Moreover, Obata a mode is in relation to the viewpoint vector, the light source vector and the normal vector of the object surface. The directions of these vectors govern the mode for FRONT-ONLY, BOTH SIDES, or BACK-ONLY. The three vectors offer extra freedom in selecting a mode.

However, Obata does not specifically teach the claim limitation of "assigning a transparency factor to alpha".

Obata suggests the claim limitation of "assigning a transparency factor to alpha" in column 1 and 6-7 wherein Obata teaches that, the actual display color of the image object is determined by **mixing the color of the image object and the color of the background image**, based upon the transmissivity of the translucent object which **dictates** the coefficients associated with the formula for calculating the brightness values (column 1). Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object can be controlled in such a way that an opaque object can be displayed by providing a zero value output from the diffused transmitted light component and a translucent object can be displayed by providing zero value outputs from the diffused reflection light component and the specular reflection light component (column 7) wherein the background object is displayed as blurred to obtain a superior realistic display (column 6). In the case for translucent image object, the intensity of the image object is governed by the Itr component which depends upon the transparency factor. The brightness value of the image object is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light and the final brightness result of the image object depends upon the transparency value. The transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters, depending on the relationship among the light source, viewpoint and the object surface. The intensity of the diffused transmitted light greatly varies in accordance with the angle theta made between the normal vector of the object surface and the light source vector (viewpoint vector) as being normal to the light source surface (or viewpoint surface). The angle theta is usually 0 to pi, and theta = pi signifies the case that the object surface is at a

position opposite to the light source, whereas theta = 0 means the case that the object surface is in a parallel and opposed relation to the light source so that it is in the most bright condition.

Finally, Obata teaches that, *by appropriately setting the coefficients associated with the intensity components*, the display of an opaque object or a translucent object (two different opacity values associated with the same image object) is realized. In the case for translucent image object, the intensity of the image object is governed by the Itr component and therefore **Itr is proportional to the transparency factor** for the blending of the effect of light source and the translucent image object. In this case, the brightness value is only determined by Itr because he transparency of the image object with respect to the light source is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light wherein only Itr component determines the color of the translucent image object (column 7, lines 12-25) so that *the outline of a light source* which is ***seen through*** (blended with opacity values) the translucent object is blurred to obtain a superior realistic display of the translucent object. The other term in the image blending as being proportional to (1-alpha) is set to zero due to the fact that the coefficients related to other components are set to zero. Note that the transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters.

In a non-limiting example, the transparency or opacity value of an image object pixel is proportional to cos (theta) which is the inner product between the normal vector of the object surface and the viewpoint vector being perpendicular to the viewing surface (say eye ball). If the viewpoint vector is in perpendicular to the object surface, cos (theta) = 1, resulting in the maximum opacity. It is also noted that the viewpoint vector and the light source vector of the

prior art reference may be changed instead of fixed relative to each other and therefore this example applies only to a very specific situation in which the sheet face or the object surface being perpendicular to the viewpoint while the viewpoint vector and the light source vector are in opposite direction. If both the viewpoint and the light source are perpendicular to the sheet of paper, the transparency or opacity of the sheet of paper is maximum because cos(theta) = 1.

Therefore, according to the teaching of Obata, it would have been obvious to assign a transparency factor to alpha. Doing so would enable the modification of the color of the object by **mixing the color of two image objects such as the image object and the color of background image**.

Re claims 22, 26, 32, Obata discloses identifying a vector normal to a viewing surface (e.g., identifying a light vector on the same side or at the same direction of the viewing surface being normal to a viewing surface; column 6-7) and incident at an object having an object surface (the image object having an object surface; Figs. 2, 8 and 10), the vector creating an angle of incidence at the object surface (col. 6-7), and modulating the transparency of an image of the object as a function of the angle of incidence of the vector at the object surface (col. 6-7), wherein the function comprises a cosine function (col. 6-7; Figs. 2, 8 and 10). In other words, Obata discloses a method for displaying a translucent object or an opaque object on a display screen comprising a step of displaying a translucent object by calculating the color intensity. The color intensity comprises an ambient light component and the diffused transmitted light component, which is in relation to an angle made between a normal vector of the object surface and a light source vector as being at normal to the light surface, the diffused transmitted light

coefficient, and the intensity value corresponding to the light source. The angle of incidence of the incident light source being over the range of 0 to pi, so that the object develops its own color intensity on the basis of the diffused transmitted light coefficient Ktr, the intensity value corresponding to the incident light from a light source. The intensity or brightness of the image object is described by the color and/or transparency values. Obata teaches that, the actual display color of the image object is determined by **mixing the color of the object and the color of background**, based upon the transmissivity of the translucent object (column 1). Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object can be controlled in such a way that an opaque object can be displayed by providing a zero value output from the diffused transmitted light component and a translucent object can be displayed by providing zero value outputs from the diffused reflection light component and the specular reflection light component (column 7) wherein the background object is displayed as blurred to obtain a superior realistic display (column 6). In the case for translucent image object, the intensity of the image object is governed by the Itr component and therefore Itr determines the transparency factor. The translucency or transparency of the image object is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light. The transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters. The intensity of the diffused transmitted light greatly varies in accordance with the angle theta made between the normal vector of the object surface and the light source vector as being normal to the light source surface. The angle theta is usually 0 to pi, and theta = pi signifies the case that the object surface is at a position

opposite to the light source, whereas theta = 0 means the case that the object surface is in a parallel and opposed relation to the light source so that it is in the most bright condition.

Re claims 24, 28, 34, and 37, the limitation of claims 24, 28, 34, and 37 are identical to claims 22, 26, and 32 above. Therefore, claim 26 is treated with respect to grounds as set forth for claims 22, 26, and 32 above except for the function comprises a non-linear function (col. 6-7). In other words, Obata discloses a cosine function of theta. The cosine function is a non-linear function.

Remarks

1. Applicant's arguments, filed 12/27/2004, have been fully considered but they are not deemed to be persuasive.

2. Applicant argues in essence with respect to the claim 20 and similar claims that:

(A) "The Office asserts that 'Obata teaches selecting a mode, the mode is FRONT_ONLY, BOTH SIDES, or BACK_ONLY (Depending on the relationship among the viewpoint vector, the light source vector and the normal vector of the object surface, FRONT_ONLY, BOTH_SIDES, or BACK_ONLY is judged; column 7)...' It is respectfully noted that Obata does not recite a 'mode' in col. 7. Even if Obata did recite a mode, however, the Office admits that the mode 'depends on the relationship among the viewpoint vector, the light source vector, and the normal vector...'..Since the mode in claim 20 does not depend on a light source vector sub-element, by extension the Office admits that a 'mode' that might be inferred from Obata col. 7 is different from the mode claimed by the Applicant in claim 20."

In response to the arguments in (A), Obata implicitly teaches selecting a mode, the mode is FRONT-ONLY, BOTH SIDES, or BACK-ONLY. This is because Obata implicitly discloses identifying a mode in relation to the viewpoint vector, the light source vector and the normal vector of the object surface (column 6-7). The FRONT_ONLY, BOTH_SIDES, or BACK_ONLY mode is governed by these vectors. The election of the vectors or selection of the locations of the viewpoint and light source determines the selection of the FRONT_ONLY, BOTH_SIDES, or BACK_ONLY mode. Obata explicitly teaches identifying a light vector on the same side or **at the same direction** of the viewing surface being normal to a viewing surface (column 6-7), which are subsequently used to determine the transparency of an image of the object is **a function of the angle of incidence** of the vector at the object surface which is a cosine function (col. 6-7; Figs. 2, 8 and 10).

3. Applicant argues in essence with respect to the claim 20 and similar claims that:

(B) "It is respectfully noted that claim 20 contains no light source vector (relied upon by the Office above); and Applicant can find no reference in Obata col. 6-7 to va_alpha or to oa_beta, as cited by the Office. Additionally, the Office provides no explanation for its assertion that Obata recites claim 20 elements 'assigning zero to alpha, if the mode is BACK_ONLY, and alpha less than zero'; and 'assigning minus alpha to alpha, if the mode is BOTH_SIDES, and alpha is less than zero.' Thus it appears that the Examiner is using personal knowledge as a basis for these assertions, and an affidavit is respectfully requested as required by 37 C.F.R. 1.104(d)(2)."

In response to the arguments in (B), Obata explicitly discloses in Figs. 2 and 8 the angle of incidence theta and the brightness value or the color value depends a non-linear function of the angle theta (column 6-7). From Obata's disclosure, the theta angle depends on the light source vector VL and the normal vector VN. It can be understood from Obata's reference that the angle theta is equal to pi – {*the angle between the normal vector VN of the object surface with respect to the x-axis of any reference frame*} + {*the angle of the opposite light source vector –VL (viewing from the light source) with respect to the x-axis of any reference frame*}. It is also clear that the angle between the normal vector VN of the *object surface* with respect to the x-axis of any reference frame is the object angle of the claimed invention and the angle of the opposite light source vector –VL as *viewing from the light source* with respect to the x-axis of any reference frame forms the viewing angle of the claimed invention. The viewing angle and the object angle are inferred from the Obata's disclosure in Figs. 2 and 8 and column 6-7. The viewing angle and the object angle are directly related to the angle theta and the angle theta is critical for the determination of the color value or the transparency value and Obata.

Applicant argues that the Examiner has used a notation oa_beta to denote the object angle or the angle between the normal vector of the object surface with respect to the x-axis of any reference frame and a notation va_alpha to denote the viewing angle or the angle of the opposite light source vector –VL (viewing from the light source) with respect to the x-axis of any reference frame. These notations are used for explanation only.

Applicant argues that the Examiner is using personal knowledge as a basis for these assertions, however, the Examiner only points out what are implicit in the explicit disclosure of

the prior art teaching in relation to the claim language recited in the claim 20. With regards to the implicit disclosure of the prior art reference, according to MPEP 2144.01, **"[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).**

Obata teaches the color value or the transparency value (alpha) being the cosine function of theta (column 6-7). Since Obata teaches theta = *pi – oa_beta + va_alpha,* Obata teaches determining a function cos(theta) to alpha if the mode is BACK_ONLY (*depending on the normal vector VN in relation to the light source vector VL*) which is equivalent to the claim limitation of "assigning a function of theta minus pi to alpha, if the mode is BACK ONLY." Because the color value or transparency value can never be less than zero, alpha = cos (theta) should be always larger than or equal to zero, Obata implicitly teaches comparing alpha to zero; assigning zero to alpha, if the mode is FRONT_ONLY (*depending on the normal vector VN in relation to the light source vector VL*) and alpha is less than zero. Similarly, Obata implicitly teaches the transparency value to be larger than zero or equal to zero and thereby Obata teaches assigning zero to alpha, if the mode is BACK_ONLY, and alpha less than zero. Because the color value or transparency value can never be less than zero, alpha = cos (theta) should be always larger than or equal to zero, Obata implicitly teaches assigning minus alpha to alpha, if the mode is BOTH-SIDES, and alpha is less than zero (column 6-7). These above steps are measures to prevent the alpha value being less than zero which one of the ordinary skill in the art should understand that alpha value should not be less than zero.

4. Applicant argues in essence with respect to the claim 20 and similar claims that:

(C) "Second, with respect to claims 22, 26, and 32, the Office asserts that 'Obata discloses identifying a vector normal to a viewing surface (e.g., identifying a light vector on the same side or at the same direction of the viewing surface being normal to a viewing surface; column 6-7) and incident at an object having an object surface (the image object having an object surface; Figs. 2, 8 and 10), the vector creating an angle of incidence at the object surface (col. 6-7), and modulating the transparency of an image of the object as a function of the angle of incidence of the vector at the object surface (col. 6-7), wherein the function comprises a cosine function (col. 6-7); Figs. 2, 8, and 10).' "

In response to the arguments in (C), Obata explicitly discloses in Figs. 2 and 8 the angle of incidence theta and the brightness value or the color value depends on a non-linear function of the angle theta (column 6-7). From Obata's disclosure, the theta angle depends on the light source vector VL and the normal vector VN. It can be understood from Obata's reference that the angle theta is equal to pi – {*the angle between the normal vector VN of the object surface with respect to the x-axis of any reference frame*} + {*the angle of the opposite light source vector –VL (viewing from the light source) with respect to the x-axis of any reference frame*}. It is also clear that the angle between the normal vector VN of the *object surface* with respect to the x-axis of any reference frame is the object angle of the claimed invention and the angle of the opposite light source vector –VL as *viewing from the light source* with respect to the x-axis of any reference frame forms the viewing angle of the claimed invention. The viewing angle and the object angle are inferred from the Obata's disclosure in Figs. 2 and 8 and column 6-7. The

viewing angle and the object angle are directly related to the angle theta and the angle theta is critical for the determination of the color value or the transparency value and Obata.

Therefore, Obata discloses identifying a light source vector VL which is a vector normal to a viewing surface and the light source vector is incident to the object surface (See Figs 2 and 8). Obata further discloses the angle of incidence theta being created at the object surface (Figs. 2 and 8) and the transparency value or the color value depends upon the angle of incidence of the vector at the object surface, which is a cosine function of the angle of incidence (column 6-7).

Finally, Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object (two different opacity values associated with the same image object). In the case for translucent image object, the intensity of the image object is governed by the Itr component and therefore Itr is proportional to the transparency factor for the blending of the effect of light source and the translucent image object. The translucency or transparency of the image object with respect to the light source is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light wherein only Itr component determines the color of the translucent image object (column 7, lines 12-25) so that *the outline of a light source* which is *seen through* (blended with opacity values) the translucent object is blurred to obtain a superior realistic display of the translucent object. Note that the transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters.

5. Applicant argues in essence with respect to the claim 20 and similar claims that:

(D) "The Applicant is unable to find any reference to 'identifying a vector normal to a viewing surface' as cited by the Office to Obata, col. 6-7. Neither can Applicant find 'modulating the transparency of an image of the object as a function of the angle of incidence of the vector [normal to a viewing surface and incidence to the object surface] at the object surface' or 'wherein the function comprises a cosine function' in the citations referenced by the Office. Furthermore, the Office offers no explanation how information in the latter two citations might suggest the referenced sub-elements of Applicant's claims 22, 26, and 32. Thus it appears that the Examiner is using personal knowledge as a basis for these assertions, and an affidavit is respectfully requested as required by 37 C.F.R. 1.104(d)(2). Again, the Applicant respectfully requests that the Office recite the elements taught by Obata using specific line references to Obata (or Obata's element reference numbers)."

In response to the arguments in (D), Obata discloses identifying a light source vector VL which is equivalent to a vector normal to a viewing surface and the light source vector and the light source vector VL is incident to the object surface (See Figs 2 and 8). Obata further discloses the angle of incidence theta being created at the object surface (Figs. 2 and 8) and the transparency value or the color value depends upon the angle of incidence of the vector at the object surface, which is a cosine function of the angle of incidence (column 6-7).

Obata discloses a method for displaying a translucent object or an opaque object on a display screen comprising a step of <u>displaying a translucent object by calculating the color</u>

intensity. The color intensity comprises an ambient light component and the diffused transmitted light component, which is in relation to an angle made between a normal vector of the object surface and a light source vector as being at normal to the light surface, the diffused transmitted light coefficient, and the intensity value corresponding to the light source. The angle of incidence of the incident light source being over the range of 0 to pi, so that the object develops its own color intensity on the basis of the diffused transmitted light coefficient Ktr, the intensity value corresponding to the incident light from a light source. The intensity or brightness of the image object is described by the color and/or transparency values. Obata teaches that, the actual display color of the image object is determined by **mixing the color of the object image and the color of background image**, based upon the transmissivity of the translucent object (column 1). Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object can be controlled in such a way that an opaque object can be displayed by providing a zero value output from the diffused transmitted light component and a translucent object can be displayed by providing zero value outputs from the diffused reflection light component and the specular reflection light component (column 7) wherein the background object is displayed as blurred to obtain a superior realistic display (column 6). In the case for translucent image object, the intensity of the image object is governed by the Itr component and therefore Itr determines the transparency factor. The translucency or transparency of the image object is determined by a number of the input parameters such as the diffused transmitted light coefficient and reflection coefficient of ambient light. The transparency is zero for an image object to be displayed as an opaque object after setting the coefficients associated with the intensity components or parameters. The intensity of the diffused transmitted

light greatly varies in accordance with the angle theta made between the normal vector of the object surface and the light source vector as being normal to the light source surface. The angle theta is usually 0 to pi, and theta = pi signifies the case that the object surface is at a position opposite to the light source, whereas theta = 0 means the case that the object surface is in a parallel and opposed relation to the light source so that it is in the most bright condition.

Applicant argues that the Examiner is using personal knowledge as a basis for these assertions, however, the Examiner wishes to point out what are implicit in the explicit prior art disclosure in relation to the claim language recited in the claim 20. With regards to the implicit disclosure of the prior art reference, according to MPEP 2144.01, "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).

6. Applicant argues in essence with respect to the claim 20 and similar claims that:

(E) "The Office references terms from Obata that are non-analogous to those used in the Application, with no explanation for why the analogy applies. The Office does not provide a citation to any suggestion in Obata for modifying Obata's color intensity calculation derived from the relative angles of impinging light sources to yield object transparency as a function of the viewing angle calculation in the application. Claim 20 does not address color intensity, but rather a mode selection clarified by Applicant's specification to include a transparency factor, calling for opacity of a displayed image..."

In response to the arguments in (E), the Examiner asserts that Obata teaches the color intensity values including the transparency values or opacity values as derived from a non-linear function of the angle of incidence. The transparency factor of the object is also a contributing factor in the display color of the image object including the opacity values or transparency values because transparency value is a color component of the image object. Moreover, Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object (two different opacity values associated with the same image object) can be controlled in such a way that an opaque object can be displayed by providing a zero value output from the diffused transmitted light component as corresponding to zero opacity value. A translucent object can be displayed by providing zero value outputs from the diffused reflection light component and the specular reflection light component and there is only one component Itr associated with the translucent image object (column 7 and column 9, lines 20-30), wherein the background object is displayed as blurred to obtain a superior realistic display (column 6; in which the blending is performed between the background image object and the translucent image object having a term proportional to the alpha in relation to the diffused transmitted light component and a zero term proportional to (1-alpha) in relation to the original pixel color of the translucent image object.

7. Applicant argues in essence with respect to the claim 20 and similar claims that:

(F) "It is clear from Obata that the 'transparency' taught therein is not a modulating output of the Obata method/apparatus...The Applicant can find no motivation in Obata or in the arguments set forth by the Office to modify the material characteristics in Obata

resulting in color mixing of the displayed object to obtain the transparency factor recited in claim 20 of the application as a function of the viewing angle relative to the object face."

In response to the arguments in (F), although Obata mentions the characteristics of the material include its transmissivity and its transparency, Obata also teaches the transparency or the blending factor of the image object and the background image or the light source. The material's transparency should not be confused with the blending transparency. **Apparently, the material characteristics in Obata affects the coefficient values for calculating the brightness and color values of the image object.**

Moreover, the Examiner asserts that Obata teaches the color intensity values including the transparency values or opacity values as derived from a non-linear function of the angle of incidence and the color intensity values are also associated with the material characteristics. The transparency factor of the object is also a contributing factor in the display color of the image object including the opacity values or transparency values because a transparency value is a color component of the image object. Moreover, Obata teaches that, by appropriately setting the coefficients associated with the intensity components, the display of an opaque object or a translucent object (two different opacity values associated with the same image object) can be controlled in such a way that **an opaque object can be displayed by providing a zero value output from <u>the diffused transmitted light</u> component as corresponding to zero opacity value**. *A translucent object can be displayed by providing zero value outputs from the diffused reflection light component and the specular reflection light component and there is only one*

component Itr associated with the translucent image object (column 7 and column 9, lines 20-30), wherein the background object is displayed as blurred to obtain a superior realistic display (column 6; in which the blending is performed between the background image object and the translucent image object having a term proportional to the alpha in relation to the diffused transmitted light component and a zero term proportional to (1-alpha) in relation to the original pixel color of the translucent image object.

8. Applicant argues in essence with respect to the claim 20 and similar claims that:

(G) "The Applicant respectfully notes that the Office repeatedly admits in the paragraph above that the opacity and translucency mentioned in Obata are functions of various light source vectors and their respective angles relative to the object normal vector. As the Applicant's specification makes clear, however, transparency as taught in the Application is based upon the viewing vector relative to the object normal vector."

In response to the arguments in (G), Obata explicitly discloses in Figs. 2 and 8 the angle of incidence theta and the brightness value or the color value depends on a non-linear function of the angle theta (column 6-7). From Obata's disclosure, the theta angle depends on the light source vector VL (in which the light source coincides with the viewpoint) and the normal vector VN. It can be understood from Obata's reference that the angle theta is equal to pi – {the angle between the normal vector VN of the object surface with respect to the x-axis of any reference frame} + {the angle of the opposite light source vector –VL (*viewing from the light source so that the VL=VE*) with respect to the x-axis of any reference frame}. It is also clear that the angle

between the normal vector VN of the object surface with respect to the x-axis of any reference frame is the object angle of the claimed invention and the angle of the opposite light source vector –VL *as viewing from the light source* with respect to the x-axis of any reference frame forms the viewing angle of the claimed invention. The viewing angle and the object angle are inferred from the Obata's disclosure in Figs. 2 and 8 and column 6-7. The viewing angle and the object angle are directly related to the angle theta and the angle theta is critical for the determination of the color value or the transparency value and Obata.

9. Applicant argues in essence with respect to the claim 20 and similar claims that:

(H) "If one holds a sheet of copy paper up to an office light or to a window, with the sheet face perpendicular to the person's viewpoint, the transparency of the paper can be noted. If the sheet is slowly rotated so that the sheet face is less perpendicular to the viewpoint, it can be noted that transparency decreases as the sheet is rotated away from the perpendicular position. Repeating this example in the different types of light recited in Obata displays the effect that is clearly the stated objective in Obata, realism…In constrast, displaying the sheet of paper perpendicular to the viewpoint according to embodiments recited in claims from the Application results in maximum opacity; and transparency *increases* as the sheet is rotated away from the perpendicular."

In response to the arguments in (H), Applicant apparently admitted that Obata teaches changing the transparency of the image object. The Examiner disagrees with the applicant's arguments in which applicant differentiates the opacity with the transparency because both

opacity and transparency value refer to the alpha value. Applicant's transparency or opacity value of an image object pixel is proportional to cos (theta) which is the inner product between the normal vector of the object surface and the viewpoint vector being perpendicular to the viewing surface (say eye ball). If the viewpoint vector is in perpendicular to the object surface, cos (theta) = 1, resulting in the maximum opacity. In contrary to applicant's argument that the transparency of the sheet of paper *increases* as the sheet is rotated away from the perpendicular, Applicant's opacity or transparency *decreases* as the sheet is rotated away from the perpendicular because cos(theta) is less than 1.

Moreover, Applicant ignores the fact that the viewpoint vector and the light source vector of the prior art reference may be changed instead of fixed relative to each other and therefore this example applies only to a very specific situation in which the sheet face or the object surface being perpendicular to the viewpoint while the viewpoint vector and the light source vector are in opposite direction. If both the viewpoint and the light source are perpendicular to the sheet of paper, the transparency or opacity of the sheet of paper is maximum because cos(theta) = 1 which results in the same result as the applicant's result. Note that Obata provides an extra freedom by selecting the three vectors to produce a mode of selection.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (703) 605-1213. The examiner can normally be reached on 8:00 - 6:30 (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeffrey A. Brier
PRIMARY EXAMINER

jcw